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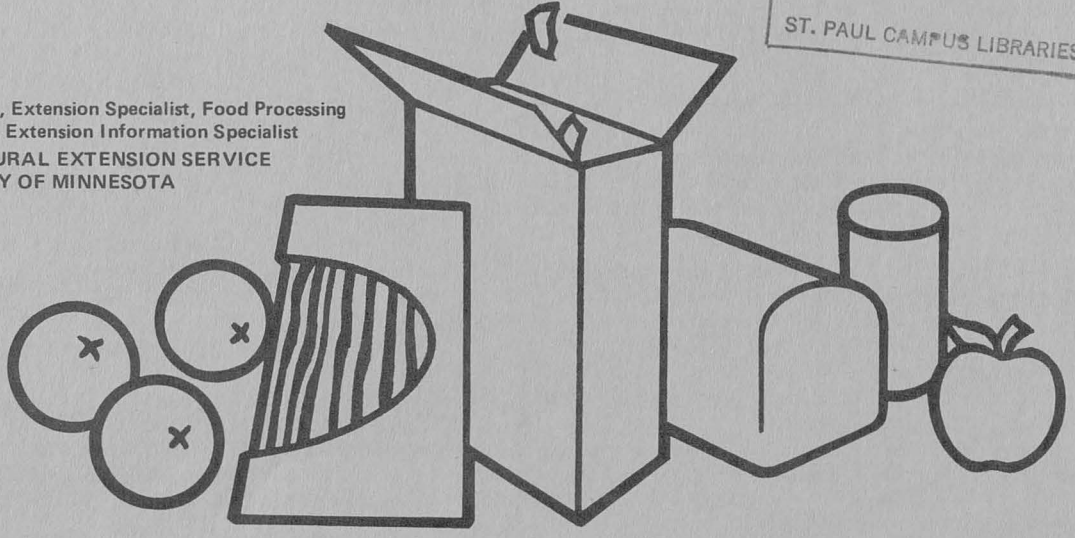
FOOD ADDI-TIVES

V.S. Packard, Extension Specialist, Food Processing
Susan Myers, Extension Information Specialist
AGRICULTURAL EXTENSION SERVICE
UNIVERSITY OF MINNESOTA



FOOD ADDITIVES

Food additives. What are they? Why are they used in food? Are they safe to eat?

The answers to these questions require an understanding of the nature and function of additives, the kinds of risks involved in eating them (or any food), and the tests used to determine "relative safety." Nothing is 100 percent harmless, but some foods and some additives pose less risk than others.

DEFINITION

Additives are legally defined by regulation as "any substance, the intended use of which results or may reasonably be expected to result, directly or indirectly, in its becoming a component or otherwise affecting the characteristic of any food . . ."

There are two broad types of food additives:

Intentional (Direct) additives are substances added to a food as an ingredient for some specific purpose. For example, pectin or some similar product, is used in making jams and jellies to get that special consistency.

Incidental (Indirect) are contaminants that may end up in food as a result of their use on food crops, in feed for livestock, or in handling or storage of food. These include pesticides, drugs, cleaning and sanitizing compounds, and food packaging materials.

In terms of allowable usage, additives are classed in one of two categories:

Regulated additives are compounds which must be tested for safety and intended use before approval is given. FDA regulates products in which these additives may be used and also the amounts used.

GRAS (generally recognized as safe) additives are substances recognized by experts as having been historically shown safe for their intended functions. The term was first used in the 1958 amendment to the Food, Drug, and Cosmetic Act to allow continued use of a substance that had not been tested, but only if it met certain previous requirements. Originally, this special list was to avoid the cost of testing to prove relative safety. In recent years GRAS additives have come under scrutiny and today, along with regulated additives, are being tested for safety.

MAJOR USES OF INTENTIONAL ADDITIVES

FDA recognizes 32 categories of additive functions in food.

1. prevent caking
2. prevent or retard growth of microbes
3. retard rancidity (oxidation)
4. coloring
5. curing and pickling
6. dough strengthening
7. drying
8. emulsifying
9. enzymes for processing
10. firming aids
11. flavor enhancing
12. flavoring
13. flour treating
14. formulation aids (carriers, fillers)
15. fumigants
16. humectants (prevent hardening through drying)
17. leavening
18. lubricants
19. non-nutritive sweetening
20. nutrient supplementation
21. nutritive sweetening
22. oxidizing and reducing (to promote stability)
23. acidity control
24. processing aids
25. propellants, aerating aids
26. sequestrants (tie up elements that may cause adverse effects)
27. solvents
28. thickeners
29. surface-active control
30. surface-finish control
31. synergists (activators)
32. texturizers

The major categories include coloring, flavoring, preserving, emulsifying (holding ingredients together), and thickening (stabilizing).

Food Coloring is used to enhance color consistency, to promote palatability, and also to aid food identification. Important consumer questions are: Do you use color as a gauge to quality in food purchases? Would you purchase and eat uncolored margarine, colorless cherry soda, pink-to grey-colored strawberry ice cream? Would you be willing to eat a vegetable protein meat substitute (made like a beef patty, for example) with anything other than a meat color? Your answer will help determine the kind and amount of color used in the future.

Food Flavoring substances are one of the largest additives groups. They include naturally occurring flavors, like citric acid of citrus fruits; nature-identical synthetics, compounds identical to citric acid which are produced in the laboratory; and artificial flavors, flavors not found to occur in nature. Allyl alcohol, combined with butyric acid (found in milk fat), forms a compound called allyl butyrate that smells like apples. But allyl butyrate is not found anywhere in nature. Flavor enhancers are additives that make a food more flavorful without themselves adding to the flavor, such as monosodium glutamate. Flavoring compounds, though numerous, are among those additives used in very small amounts. Some scientists suggest that flavors constitute little or no hazard because the amounts used are too small to be significant. But not all scientists agree.

Food Preservation is one of the most important functions of additives. Food waste would be enormous without substances to prevent spoilage. Foodborne disease would greatly increase. Quality would deteriorate faster. Preservatives prevent microbial growth, prevent oxidation (rancidity) of fats, and maintain color. Both naturally occurring and synthetic preservatives are used. Synthetic antioxidants are widely used to prevent rancidity in such things as dry breakfast cereals, dry mixes for beverages and desserts, potato flakes, etc. because they generally are more stable and more effective than their natural counterparts.

Emulsifiers and Stabilizers, or blenders and thickeners, prevent food from separating into solid and liquid portions. They keep food in a semi-solid (or jelly-like) state. Lecithin is a commonly used emulsifier; starch, a thickener. Many stabilizers are gums and resins of various trees, seeds, and other plant growths. Agar and carrageenan come from seaweed. Carboxymethylcellulose is derived from the cellulose (woody part) of trees. These additives are used in foods like jams and jellies, puddings and fillings, ice cream, whipped toppings, salad dressings, baked goods, chocolate products, and some cheeses.

ASSESSING RISK

It is important to know the various kinds of health problems that can arise from the use of additives or foods per se. Evaluating these risks is a highly technical, ever-improving scientific skill. Techniques for determining safety are much more sophisticated and sensitive today, thus certain additives suddenly are declared unsafe.

However, many common foods and certain nutrients would not pass the tests currently applied to additives. Generally speaking, more is known of the relative safety of additives than of any common foods. Additives are banned if risks seem to outweigh benefits. Presently they must be banned, under the Delaney Clause of the Food Additives Amendment, if found to cause cancer in any test species of animal. The following kinds of toxicity must be considered in testing additive safety:

Acute Toxicity is a measure of the response that occurs when very large doses of the compound are fed. Remember, anything eaten in overdose can make you ill or maybe even cause death.

Chronic Toxicity is a measure of what might be expected to happen when small amounts of a substance are fed over a long period of time. Cancer is one response of chronic toxicity.

The effects of additives on fertility, birth defects, and genetic influences must also be considered.

Additives are measured for relative safety by studying these harmful conditions. This is why costs may run into the millions of dollars for a safety check on any one compound.

TESTING PROCEDURE

The food industry must prove to FDA by appropriate, scientific research that a food additive is safe for its intended use. The petition for approval of a new additive presented to the FDA must include the following information:

1. chemical composition of the food additive.
2. manufacturing process of the additive.
3. method used to detect and measure presence of this additive in the food supply.
4. data to establish that the additive will accomplish the intended physical or technical effect.
5. amount of additive to be used (which should be no higher than necessary to accomplish the objective).
6. test results carried out using at least two animal species through two or more generations, usually requiring at least 3 years of work.
7. results of biochemical studies to indicate how the body handles the additive, where it is stored, how it is broken down and excreted.

SOME ADDITIVES THAT HAVE BEEN BANNED OR ARE UNDER SUSPICION

Cyclamate is an artificial sweetener that was banned when suspected of causing cancer. It is not yet proven to be a cause of cancer.

Saccharin is an artificial sweetener that was banned when evidence suggested it to be a cause of cancer. Scientists do not agree that the evidence **proved** beyond doubt that this sweetener is a carcinogen, but evidence was strong enough to warrant banning under the Delaney Clause.

Safrole is a flavoring compound formerly used in root beer-flavored soda and candy. It was banned, but safrole occurs naturally in sassafras (from which sassafras tea is made), nutmeg, and cinnamon.

Monosodium glutamate (MSG) is a flavor enhancer suspected of causing an allergic-type response called Chinese Restaurant Syndrome. It is still very much in use. MSG is the sodium salt of glutamic acid, a common amino acid of protein. MSG forms inside the body whenever protein with glutamic acid is eaten.

FD & C Red No. 2 is a synthetic coloring banned because (1) there was no proof it was not weakly cancer-causing, (2) its use was cosmetic only, (3) its safety was not provable. Few foods would pass those three criteria of safety.

FD & C Red No. 40 was banned when suspected of being cancer-causing. Its use was formerly limited to maraschino cherries. Initial response seems to indicate that consumers will not as readily purchase less brilliantly colored maraschino cherries. This food is representative of a food class in which use is rare to intermittent.

BHT (butylated hydroxytoluene) is a synthetic antioxidant. One study in 1959 found BHT to cause production of eyeless young rats, but work in 15 different laboratories failed to confirm the results. Recently it was found to lengthen life of rats by one-third of a lifetime. BHT also inhibits peroxidation, which may increase potency of cancer-causing agents. It is still under suspicion.

Nitrites are used as a preservative in cured meat products. They form nitrosamines with certain other food ingredients. Nitrosamines are a family of compounds, some of which are known to cause cancer. Nitrite is the only additive known to be 100 percent effective in inhibiting C. botulinum (which causes botulinum food poisoning). Cancer risk must be weighed against risk of botulinum growth in cured meats.

Carrageenan is a stabilizer (thickener) obtained from seaweed that has been used for a century (or longer) by homemakers along the Irish coast. In one misapplied test carrageenan was found to cause ulcers in guinea pigs. It was recently found to cause non-pathological liver lesions in rats at very high levels of intake. Its future is still in doubt.

Artificial colors—and flavors—have been suggested as possible causes of hyperactivity in children. If you are concerned, avoid soft drinks, snack foods, and dessert products.

PROPER AND IMPROPER USES OF ADDITIVES

Appropriate, even essential, uses of additives would appear to be the following:

1. to improve or maintain nutritional value
2. to enhance quality
3. to reduce waste
4. to enhance consumer acceptance
5. to make food more readily available
6. to improve keeping quality
7. to aid food preparation

Inappropriate uses of additives would include:

1. to disguise faulty or inferior processes
2. to conceal damaged, spoiled, or inferior goods
3. to deceive consumers
4. to gain some functional property at the expense of nutritional quality
5. to substitute for economical, well-recognized, manufacturing processes or practices
6. to use in amounts in excess of that required to achieve the intended effect

Keeping food safe and nutritious is everybody's business!

REFERENCES

For more information about food additives and their safety, contact any of the following agencies:

American Dietetic Association
620 N. Michigan Avenue
Chicago, Illinois 60611

Food and Drug Administration
5600 Fishers Lane
Rockville, Maryland 20852

U.S. Department of Agriculture
Agricultural Research Service
Extension Service
Washington, D.C. 20250

American Home Economics Association
2010 Massachusetts Avenue, N.W.
Washington, D.C. 20036

Institute of Food Technologists
221 N. La Salle Street
Chicago, Illinois 60611

In Minnesota you may write or call:

Blanche Erkel
Consumer Affairs Officer
Food and Drug Administration
240 Hennepin Avenue
Minneapolis, Minnesota 55401
(612) 725-2121

Slide sets and references available:

Ann's Additive Story, 35 slides with script. Manufacturing Chemists Association, Inc. Washington, D.C. 20009

Food Additives, slides with script and/or tape prepared by V.S. Packard. Agricultural Extension Service, Visual Aids, Coffey Hall, University of Minnesota, St. Paul, Minnesota 55108.

Food Additives, What Are They, How Are They Used? Food Additives, Who Needs Them? 1974. Manufacturing Chemists Association, Inc., Washington, D.C. 20009.

Processed Foods and the Consumer: Additives, Labeling, Standards, and Nutrition. 1976. V.S. Packard. University of Minnesota Press, Minneapolis, Minnesota 55455.

Are Additives Badditives? 1977. Kay Munson. Cooperative Extension Service, Iowa State University, Ames, Iowa 50011.

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